WE CLAIM:

1.   A computer-implemented method for compressing a digital multi-spectral image represented by a first color space, the method comprising the steps of:

5   a)   dividing a first set of first color space components into first and second paths;

b-1)   compressing the first color space components on the first path;

b-2)   dividing the compressed color space components into two paths;

b-3)   inputting one path of the compressed first color space components into an

10   output function;

b-4)   reconstructing the other path of compressed first color space components; and

b-5)   transforming the reconstructed first color space components into a first set of second color space components using a first bounded-loss color space

15   transformation;

c)   transforming the second set of first color space components on the second path into a second set of second color space components using a second bounded-loss color space transformation;

d)   inputting the differences between each of the first set of second color

20   space components and the second set of second color space components into a difference function whereby the differences are bound by a predetermined range of values;

e)   compressing the output of the differences; and

f)   inputting the compressed differences into the output function.

2.   The method according to claim 1 wherein the predetermined range of

values is limited to a designed acceptable loss.

3.   A computer-implemented method for compressing a digital multi-spectral

image represented by a first color space, the method comprising the steps of:

a)   dividing a first set of first color space components into first and second

paths;

b-1)   transforming the first set of first color space components on the first path

into a plurality of second color space components using a first bounded-

loss color space transformation;

b-2)   compressing the second color space components and dividing the

compressed second color space components into two paths;

b-3)   inputting one path of the compressed second color space components into

an output function;

b-4)   reconstructing the other path of the compressed second color space

components;

b-5)   transforming the reconstructed second color space components into a first

set of third color space components using a second bounded-loss color

space transformation;

c) transforming the first color space components on the second path into a second set of third color space components;

d) inputting the differences between each of the first set of third color space components and the second set of third color space components into a difference function whereby the differences are bound by a predetermined range of values;

e) compressing the output of the differences of the first set of third color space components, and the second set of third color space components; and

f) inputting the compressed differences into the output function.

4. The computer implemented method according to claim 3 wherein the first color space components on the second path are transformed into a set of second color transforms, which are then transformed into the second set of third color space components.

5. The method according to claim 3 wherein the predetermined range of values is limited to a designed acceptable loss.

6. A method for compressing digital multi-spectral images comprising the steps of:

a) compressing a first set of first color space components to thereby generate first color space compressed data;

b) reconstructing the first color space compressed data to a plurality of reconstructed first color space components;

c) transforming the reconstructed first color space components to a first set of second color space components;

d) determining component differences based on the differences between the second set of color space components and a second set of second color space components that have been transformed from a second set of first color space components without first being compressed and reconstructed;

e) compressing the component differences of the second color space components; and

f) incorporating the second color space compressed data and a compressed set of first color space data into a compressed data stream.

7. The method according to claim 6 wherein the step of compressing a plurality of first color space components to thereby generate first color space compressed data comprises the step of compressing via a JPEG standard.

8. The method according to claim 6 wherein the step of compressing the component differences comprises the step of compressing via a differential JPEG standard.

9.   The method of claim 6 wherein the step of determining component differences based on the difference between the first and second sets of second color space components comprises the step of inputting corresponding color space components into a difference unit.

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10.   The method according to claim 9 wherein the difference data comprises the difference between the first set of second color space components and the second set of second color space components wherein the differences are bound by a predetermined range of values.

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11.   The method according to claim 10 wherein the predetermined range of values is limited to a designed acceptable loss.

12.   The method according to claim 11 wherein the designed acceptable loss is

15   equal to or is less than the image noise level.

13.   A method for compressing digital multi-spectral images comprising the steps of:

a)   transforming a first set of first color space components to a first set of

20   second color space components

a)   compressing a first set of second color space components to thereby generate second color space compressed data;

b) reconstructing the first set of second color space compressed data to a plurality of reconstructed second color space components;

c) transforming the reconstructed first set of second color space components to a first set of third color space components;

5 d) determining component differences based on the differences between the first set of third color space components and a second set of third color space components that have been transformed from a second set of first color space components without first being compressed and reconstructed;

e) compressing the component differences of the third color space

10 components; and

f) incorporating the compressed differences of the third color space components and a compressed set of second color space data into a compressed data stream.

15 14. The method according to claim 13 wherein the steps of compressing the second set of color space components to thereby generate the compressed space 2 data comprises compressing via a JPEG standard.

15. The method according to claim 13 wherein the step of compressing the

20 third color space component differences comprises the step of compressing via a differential JPEG standard.

16.   The method of claim 13 wherein the step of determining component differences based on the difference between the first set and the second set of third color space components comprises the step of inputting corresponding color space components into a difference unit.

17.   The method according to claim 16 wherein the difference data comprises the difference between the first set of third color space components and the second set of third color space components wherein the differences are bound by a predetermined range of values.

18.   The method according to claim 17 wherein the predetermined range of values is limited to a designed acceptable loss.

19.   The method according to claim 18 wherein the designed acceptable loss is equal to or less than the image noise level.

20.   The method according to claim 13 wherein the second set of first color space components is transformed into the second set of third color space components by first transforming from the first color space to a second color space, and transforming from the second color space components to the third color space components.